

In the Claims

Please amend claims 12, 18, 24, 26, 30, 31, 53 and 57 as indicated below. Please cancel claim 29. Clean copies of the amended claims are attached.

1 12. (Amended) A method of speed qualifying a customer line for data
2 transmission, comprises:
3 identifying a proxy line in a cable carrying the customer line;
4 performing one-ended electrical measurements on the proxy line; and
5 predicting a data rate for the customer line from the measurements.

1 18. (Amended) The method of claim [12] 13, wherein the modem model
2 indexes predicted data rates by an averaged normalized line length and a noise level of
3 the customer line.

1 24. (Amended) A method of marketing telephone lines to customers,
2 comprising:
3 speed qualifying each customer line from one-ended electrical measurements, the
4 speed qualifying classifying the lines for [either] high speed digital service or low speed
5 digital service; and
6 offering the high-speed service to at least a portion of the customers in response to
7 the portion having lines qualified to support high-speed digital service.

1 26. (Amended) A method of marketing telephone lines to customers,
2 comprising:
3 speed pre-qualifying each line for high-speed digital service or low-speed digital
4 service by using one-ended electrical measurements; and
5 connecting at least a portion of the lines qualified for high-speed digital service to
6 customers requesting high-speed digital service in response to receiving said requests.

1 30. (Amended) The system of claim [29] 31, wherein the computer is adapted
2 to:
3 identify a line model for the selected line from the measurements thereon;
4 identify a modem model for use with the selected line; and

5 predict a data rate for the selected line when operated with the selected modem by
6 combining the line and modem models.

1 31. (Amended) A system for characterizing performance of customer lines for
2 data transmission, comprising:

3 a computer;

4 a telephony switch coupled to a portion of the lines and adapted to connect the
5 portion to a network, to perform one-ended electrical measurements on the portion, and to
6 transmit the measurements to the computer;

7 a measurement unit coupled to the switch and computer, the unit to make the
8 measurements on a selected line in response to receiving a command from the computer,
9 the computer to predict data rates for the selected line from the measurements, [The
10 system of claim 30,] the computer being further adapted to:

11 predict whether the selected line is disqualified for data transmission from the
12 measurements thereon.

1 53. (Amended) A method of detecting a bridged tap in a customer line,
2 comprising:

3 making one-ended electrical measurements on the customer line;

4 determining one or more admittances as a function of frequency of the
5 customer line from the measurements; and

6 [reporting] detecting that the customer line has a bridged tap in response to
7 finding a signature of a bridged tap in the one or more admittances as a function of
8 frequency.

1 57. (Amended) The method of claim 53, further comprising:

2 determining whether a ratio of imaginary and real parts of a frequency
3 derivative of one of the one or more admittances has a peak; and

4 wherein the determining is based on [reporting is performed in response
5 to] finding an above threshold peak in the ratio.



What is claimed is:

1 1. A method of predicting performance of a customer line for data
2 transmission, comprises:
3 measuring electrical properties of the customer line from a central location;
4 identifying a line model for the customer line from the measurements;
5 identifying a modem model for a modem selected for use with the line, the modem
6 model providing performance data on the selected modem; and
7 predicting performance data for the customer line when operated with the selected
8 modem by combining the line and modem models.

1 2. The method of claim 1, wherein the performance data comprises a data
2 transmission rate.

1 3. The method of claim 2, further comprising:
2 predicting whether the customer line is disqualified for data transmission; and
3 wherein the act of predicting performance data is in response to predicting that the
4 line is not disqualified.

1 4. The method of claim 1, wherein the act of measuring includes using the
2 measurements to evaluate at least one admittance of the customer line at a plurality of
3 frequencies.

1 5. The method of claim 4, wherein the act of measuring includes finding at
2 least two of Y_{tr} , Y_{rg} , and Y_{tg} for the customer line.

1 6. The method of claim 5, wherein the act of identifying a line model
2 comprises:
3 determining a frequency dependent attenuation from the admittances; and
4 determining a normalized line length from the frequency dependent attenuation.

1 7. The method of claim 4, wherein the act of identifying a line model
2 comprises:
3 determining whether the customer line has a bridged tap.

1 8. The method of claim 1, wherein the act of identifying a line model includes
2 finding a frequency dependent line attenuation from the measurements.

1 9. The method of claim 1,
2 wherein the act of measuring includes driving the customer line with a signal at a
3 plurality of frequencies; and
4 the act of identifying a line model includes evaluating a property of the customer
5 line for frequencies high with respect to the frequencies of the signal.

1 10. The method of claim 1, wherein the act of measuring includes finding a
2 noise level, a capacitance, and frequency dependent admittances for the customer line.

1 11. The method of claim 2, wherein the modem model indexes predicted data
2 rates by an averaged normalized line length and a noise level of the customer line.

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1 12. (Amended) A method of speed qualifying a customer line for data
2 transmission, comprises:
3 identifying a proxy line in a cable carrying the customer line;
4 performing one-ended electrical measurements on the proxy line; and
5 predicting a data rate for the customer line from the measurements.

1 13. The method of claim 12, wherein the act of predicting a data rate further
2 comprises:
3 identifying a line model for the proxy line from the measurements;
4 identifying a modem model for a modem to use with the customer line; and
5 combining the modem model with the line model to obtain the data rate.

1 14. The method of claim 13, wherein the act of identifying a line model includes
2 finding at least two of Y_{tr} , Y_{rg} , and Y_{tg} for the proxy line at a plurality of frequencies.

1 15. The method of claim 14, further comprising one of inferring a mix of wire
2 gauges and inferring the presence of a bridged tap from the found admittances.

1 16. The method of claim 14, wherein the act of identifying a line model includes
2 finding a frequency dependent line attenuation from the measurements.

1 17. The method of claim 12,
2 wherein the act of performing includes driving the proxy line with a signal having a
3 plurality of frequencies; and
4 the act of identifying a line model includes evaluating a property of the proxy line
5 for frequencies high with respect to the frequencies of the signal.

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1 18. (Amended) The method of claim 13, wherein the modem model indexes
2 predicted data rates by an averaged normalized line length and a noise level of the customer
3 line.

1 19. A method of marketing telephone lines to customers, comprising:
2 speed pre-qualifying a plurality of the customer lines using one-ended electrical
3 measurements performed from a central location; and
4 setting billing rates of at least a portion of the lines at prices that depend on the speed
5 qualification of the portion.

1 20. The method of claim 19, wherein at least a portion of the acts of speed
2 qualification include performing electrical measurements on a proxy line.

1 21. The method of claim 19, further comprising:
2 monitoring a portion of the customer lines after being placed in service by
3 repeatedly performing one-ended electrical measurements on the portion; and
4 determining new data rates of each line of the portion from the repeated
5 measurements.

1 22. The method of claim 19, wherein each act of speed pre-qualifying,
2 comprises:
3 measuring electrical properties of one of the lines from the central location;
4 identifying a line model for the one of the lines from the measured electrical
5 properties;

6 identifying a modem model for a modem to use with the one of the lines, the modem
7 model to provide rate data on the selected modem; and
8 predicting a data rate for the one of the lines when operated with the selected modem
9 by combining the line and modem models.

1 23. The method of claim 22, the act of speed pre-qualifying the one of the lines
2 further comprising:
3 predicting whether the one of the lines is disqualified for data transmission; and
4 wherein the act of predicting a data rate is in response to predicting that the one of
5 the lines is not disqualified.

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1 24. (Amended) A method of marketing telephone lines to customers,
2 comprising:
3 speed qualifying each customer line from one-ended electrical measurements, the
4 speed qualifying classifying the lines for high speed digital service or low speed digital
5 service; and
6 offering the high-speed service to at least a portion of the customers in response to
7 the portion having lines qualified to support high-speed digital service.

1 25. The method of claim 24, wherein each act of speed qualifying comprises:
2 measuring electrical properties of one of the lines from the central location;
3 identifying a line model for the one of the lines from the electrical properties;
4 identifying a modem model for use with the one of the lines, the modem model
5 providing data rates for the selected modem; and
6 predicting a data rate for the one of the lines when operated with the selected modem
7 by combining the line and modem models.

Sub D1
26. (Amended) A method of marketing telephone lines to customers,
2 comprising:
3 speed pre-qualifying each line for high-speed digital service or low-speed digital
4 service by using one-ended electrical measurements; and
5 connecting at least a portion of the lines qualified for high-speed digital service to
6 customers requesting high-speed digital service in response to receiving said requests.

1 27. The method of claim 26, wherein each act of speed pre-qualifying
2 comprises:
3 measuring electrical properties of one of the lines from the central location;
4 identifying a line model for the one of the lines from the electrical properties;
5 identifying a modem model for use with the one of the lines, the modem model
6 providing transmission rate data on the selected modem; and
7 predicting a data rate for the one of the lines when operated with the selected modem
8 by combining the line and modem models.

1 28. The method of claim 27, wherein at least a portion of the measurements are
2 performed on a proxy line.

Sub 26
1 30. (Amended) The system of claim 31, wherein the computer is adapted to:
2 identify a line model for the selected line from the measurements thereon;
3 identify a modem model for use with the selected line; and
4 predict a data rate for the selected line when operated with the selected modem by
5 combining the line and modem models.

CS Sub 27
1 31. (Amended) A system for characterizing performance of customer lines for
2 data transmission, comprising:
3 a computer;
4 a telephony switch coupled to a portion of the lines and adapted to connect the
5 portion to a network, to perform one-ended electrical measurements on the portion, and to
6 transmit the measurements to the computer;
7 a measurement unit coupled to the switch and computer, the unit to make the
8 measurements on a selected line in response to receiving a command from the computer, the
9 computer to predict data rates for the selected line from the measurements, the computer
10 being further adapted to:
11 predict whether the selected line is disqualified for data transmission from the
12 measurements thereon.

1 32. The system of claim 30, wherein the computer is adapted to:
2 determine a frequency dependent attenuation from the measurements; and

3 determine a normalized line length from the frequency dependent attenuation.

1 33. The system of claim 30, wherein the computer is adapted to command the
2 measurement unit to order measurements on proxy lines and to predict data rates for a
3 portion of the customer lines by using the measurements on the proxy lines
4

1 34. A program storage device encoding an executable program for a method of
2 speed qualifying telephone lines for data transmission, the method comprising:
3 measuring electrical properties of a customer line from a central location;
4 identifying a line model for the customer line from the measurements;
5 identifying a modem model for use with the line, the modem model providing data
6 rates of the selected modem; and
7 predicting a data rate for the customer line when operated with the selected modem
8 by combining the line and modem models.

1 35. The device of claim 34, the method further comprising:
2 predicting whether the customer line is disqualified for data transmission; and
3 wherein the act of predicting a data rate is performed in response to predicting that
4 the line is not disqualified.

1 36. The device of claim 34, wherein the act of measuring includes finding at
2 least one admittance of the customer line at a plurality of frequencies by using the
3 measurements.

1 37. The device of claim 36, wherein the act of measuring includes finding at
2 least two of Y_{tr} , Y_{rg} , and Y_{tg} for the customer line.

1 38. The device of claim 36, wherein the act of identifying a line model includes
2 finding a frequency dependent line attenuation from the measurements.

1 39. The device of claim 36, wherein the act of identifying a line model
2 comprises:
3 determining a frequency dependent attenuation from the admittances; and

4 determining a normalized line length from the frequency dependent attenuation.

1 40. The device of claim 34, wherein the modem model lists predicted data rates
2 by averaged normalized line length and noise level of the customer line.

1 41. The device of claim 40, the method further comprising:
2 modifying the predicted data rate in response to a value of one or more quality
3 parameters, the values characterizing the selected modem.

1 42. The device of claim 41, wherein the parameters are selected from the group
2 consisting of impulse noise compensation, noise floor, echo compensation and phase
3 instability compensation.

1 43. The device of claim 34, the method further comprising:
2 identifying the customer line as a proxy line for a second telephone line; and
3 predicting a data rate for the second line from the data rate predicted for the proxy
4 line.

1 44. A method of determining the attenuation of a customer's telephony line,
2 comprising:
3 performing a plurality of one-ended measurements of frequency dependent
4 admittances of the customer's telephony line, the measurements being performed in a first
5 frequency range;
6 processing the measurements by a set of logical decision trees; and
7 adjusting values of a frequency-dependent attenuation for an average telephony line
8 to predict an attenuation of the customer's telephony line in a second frequency range, the
9 act of adjusting being responsive to results from the logical decision trees.

1 45. The method of claim 44, wherein the act of performing includes finding at
2 least two of Y_{tr} , Y_{rg} , and Y_{tg} for the customer's telephony line.

1 46. A method of determining performance of a customer telephone line, the line
2 having both a tip wire and a ring wire, comprising:

3 driving one of the two wires with a first alternating voltage at one end and the other
4 of the two wires with a second voltage at the same end and measuring voltages between
5 each wire and ground while driving the two wires;

6 driving the other of the two wires with a third alternating voltage at the same end
7 and the one of the two wires with a fourth voltage at the same end and measuring voltages
8 between each wire and ground while driving the two wires;

9 driving both the tip and the ring wires with a fifth alternating voltage from the
10 same end and measuring voltages at the tip and ring wires while driving both wires; and

11 determining admittance Y_{tg} at a plurality of frequencies from the measured voltages.

1 47. The method of claim 46, further comprising:

2 determining an apparent length of the customer line from values of said admittance
3 at a plurality of frequencies.

1 48. The method of claim 46, further comprising:

2 determining whether the customer line has a bridged tap from values of said
3 admittance at a plurality of frequencies.

1 49. The method of claim 46, further comprising:

2 determining the remaining admittances Y_{rg} and the admittance Y_{rt} at a plurality of
3 frequencies from the measured voltages.

1 50. The method of claim 49, further comprising:

2 determining a frequency-dependent attenuation of the line from the measured
3 admittances.

1 51. The method of claim 50, further comprising:

2 predicting a data rate for the line from the attenuation; and
3 adjusting the predicted data rate in response to a rating of a gauge mix of the line.

1 52. The method of claim 50, further comprising:

2 determining whether the customer line has a bridged tap from values of said
3 admittances at a plurality of frequencies;

4 predicting a data rate for the line from the attenuation; and
5 adjusting the predicted data rate in response to determining that the customer line
6 has a bridged tap.

Sub D3

2 53. (Amended) A method of detecting a bridged tap in a customer line,
3 comprising:
4 making one-ended electrical measurements on the customer line;
5 determining one or more admittances as a function of frequency of the customer
6 line from the measurements; and
7 detecting that the customer line has a bridged tap in response to finding a signature
of a bridged tap in the one or more admittances as a function of frequency.

1 54. The method of claim 53, wherein the signature is a frequency dependent
2 property of one or more admittances.

1 55. The method of claim 53, wherein the one or more admittances is an
2 admittance between a wire of the customer line and ground.

1 56. The method of claim 53, wherein the act of making one-ended
2 measurements performs the measurements through a voice test access of a telephony
3 switch.

Sub D4

2 57. (Amended) The method of claim 53, further comprising:
3 determining whether a ratio of imaginary and real parts of a frequency derivative of
4 one of the one or more admittances has a peak; and
1 wherein the determining is based on finding an above threshold peak in the ratio.